HONOLULU

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MONTEREY

TIBURON

SOUTHWEST FISHERIES CENTER

MONTHLY REPORT - MAY 1977

RESEARCH HIGHLIGHTS

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NOAA/NMFS

SOUTHWEST FISHERIES CENTER
La Jolla, California

Honolulu Laboratory
La Jolla Laboratory
Tiburon Laboratory
Pacific Environmental Group

MONTHLY REPORT - MAY 1977

STATUS OF PUBLICATIONS

Published

Davies, Isaac E., Robert J. Vent and John C. Brown. 1977. Fish school acoustic target strength. Journal du Conseil, 37(3): 17-21.

Acoustic target strengths of 1034 fish schools were measured in the California Current system during 6 cruises from November 1974 to October 1975. Measurements were made with a sidelooking, 30 kHz sonar with a pulse duration of 10 ms; a separate set of 260 schools were measured with a pulse duration of 170 ms. Peak target strength for the 10 ms data set ranged from -20 to +20 dB with a mean of -7·3 dB (s.d. of 5·9 dB); mean intensity target strength was -2·4 dB. For the 170 ms data set, peak target strength ranged from -10 to +23 with a mean of +1·6 dB (s.d. of 5·6 dB); mean intensity target strength was +4·8 dB. Target strength was found to be dependent on pulse length and range (volume sampled).

Approved by Center Director

Morrison, David C., Patricia C. Giclas, Betty J. Curry, R. Michael Laurs and Richard J. Ulevitch. The serum complement system of the albacore tuna, Thunnus alalunga. For publication in the American Journal of Physiology.

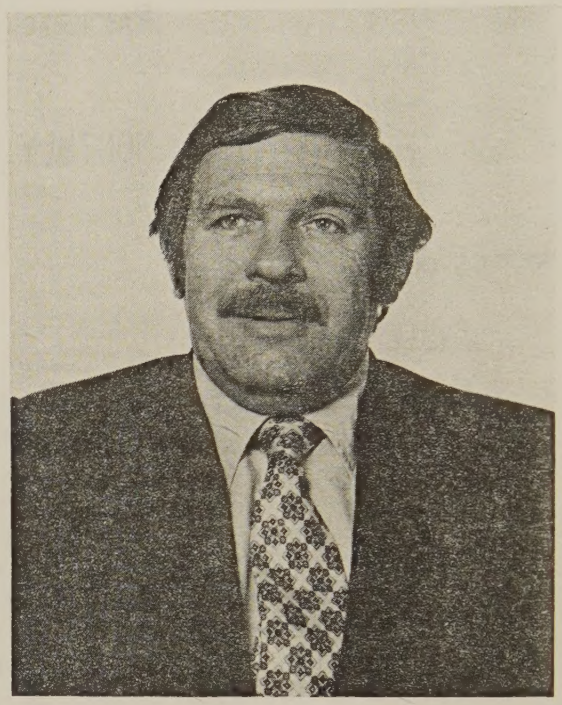
Laurs, R. Michael, Richard Ulevitch and David C. Morrison. Estimates of blood volume in the albacore tuna, Thunnus alalunga. For publication in the American Journal of Physiology.

This report does not constitute publication and is for information only.

Translation

Hanamoto, Eiji. 1976. The swimming layer of bigeye tuna. Bull. Jap. Soc. Fish. Oceanogr. 29:41-44. (Translated from the Japanese by Tamio Otsu, SWFC, Honolulu Laboratory, 1977, 7 p., Translation No. 21.)

Izadore Barrett Appointed Director of NMFS Southwest Fisheries Center



Robert W. Schoning, Director of the National Marine Fisheries Service, announced the appointment this month of Izadore Barrett, former Acting Director, as the new Director of the Southwest Fisheries Center. Barrett replaces Brian J. Rothschild who is now the NMFS Director of the Office of Policy Development and Long Range Planning in Washington, D.C.

On making the appointment, Schoning said, "Barrett is regarded highly as a scientist and administrator and is well qualified to supervise current research on tuna/porpoise, and the economic and biological studies supporting the Pacific and Western Pacific Regional Fishery Management Councils in their allocation of fishery resources."

"There is increasing importance placed on research and scientific information with the new thrust of extended jurisdiction, and it is particularly important to have an experienced, competent scientist to lead the group of trained professionals at the Center."

For the past year, Barrett has been the Acting Center Director. Previously, he had been the Deputy Director for 4 years, and Assistant Director of the Center's predecessor facility, the Fishery-Oceanography Center at La Jolla, for 2 years.

After 11 years as a scientist with the Inter-American Tropical Tuna Commission in La Jolla, Barrett was the United Nations Food and Agriculture Organization (FAO) Advisor for Fisheries to the government of Chile from 1969 to 1970, and Chief Fishery Biologist for the FAO in Santiago, Chile, from 1967 to 1969.

Barrett, who began his new assignment May 23, was born in Vancouver, British Columbia, where he received a B.A. and M.A. from the University of British Columbia. He has pursued post-graduate studies at the University of Toronto, and at the University of Washington.

The new Director is a member of a number of professional and scientific organizations and serves on many scientific committees. Most recently he was named Chairman of the Scientific and Statistical Committee of the Western Pacific Fisheries Management Council and also serves as a member of the Scientific and Statistical Committee for the Pacific Fisheries Management Council. He is the author of 25 scientific papers.

Barrett is married to the former Fulvia Quesada; they have three sons and one daughter.

HONOLULU LABORATORY

RESOURCE ASSESSMENT AND DEVELOPMENT INVESTIGATIONS (RADI)

Fish Aggregating Devices Anchored in Hawaiian Waters

Mr. Walter Matsumoto, Fishery Biologist, assisted by Mr. Donald Aasted, Fishery Methods and Equipment Specialist, and Research Assistant Bernard Ito, all of the Honolulu Laboratory, successfully anchored fish aggregating devices in Hawaiian waters during Part II of Cruise 75 (TC-77-02) of the Townsend Cromwell. Four aggregating devices were placed at the following locations: Object A, 7 miles southwest of Diamond Head in 288 fathoms of water; Object B, 15 miles south of Koko Head and off the northwest tip of Penguin Bank in 153 fathoms of water; Object C, 25 miles south of Koko Head in 311 fathoms of water; and Object D, 125 miles southeast of Kewalo Basin and 77 miles west of Hookena, Hawaii on Perret Seamount in 600 fathoms of water. After being in place only a few days there were reports of fish being caught around floating Object B. Honolulu-based charter sport fishing vessels have reported catching various species of fish, primarily wahoo, *Acanthocybium solandri*, and mahimahi, *Coryphaena hippurus*, near aggregating device B. Sport fishermen have also reported billfish strikes near floating Object A. Also 2 days after deployment small (2-3 lb) skipjack tuna were seen jumping within 50 yds of Object B, and a bird flock of about 50 birds was sighted about 4 miles south of Object B.

Mr. Matsumoto, assisted by Research Assistants Bernard Ito and Robert Moffitt, also made a later short cruise on a chartered vessel, Valiant Maid, to monitor 3 of the anchored devices (Object D was not visited). All 3 of the devices were still in place but had suffered damage from strong winds, currents and heavy seas. One mahimahi, 78.0 cm, was caught by trolling around Object B. In addition 12 other mahimahi and a school of triggerfish were seen at Object B. One mahimahi and 4 mahimahi were seen at Object A and C, respectively. Mr. Matsumoto also observed an unidentified school of bait-size fish around floating Object C. He plans to make further, periodic visits to the floating devices to monitor their effectiveness as aggregating devices.

Fishery Biologist Departs for Albacore Meeting in Japan

Dr. Jerry Wetherall, Leader, Fishery Management Research Task, departed Honolulu on May 14 to attend the North Pacific Albacore Workshop in Shimizu, Japan. This is the second workshop on the population dynamics of North Pacific albacore and is the result of an informal agreement between the Southwest Fisheries Center (SWFC) and the Far Seas Fisheries Research Laboratory, Shimizu, Japan, to promote and accelerate joint research on the North Pacific albacore stock. The first workshop was held at the Honolulu Laboratory in December 1975.

Draft of two working papers prepared by Dr. Wetherall and other SWFC personnel will be presented at the workshop. The papers are, "Estimates of growth rates for North Pacific albacore, *Thunnus alalunga* (Bonnaterre), based on an analysis of tag returns" by Laurs and Wetherall, and "A comparison of methods for estimating age-specific fishing mortality rates from catch-at-age data" by Wetherall and Yong.

In addition to Dr. Wetherall, other SWFC scientists who will participate in the workshop are Dr. R. Michael Laurs and Dr. Gary Sakagawa of the La Jolla Laboratory.

Northern Anchovy to be Tested as Skipjack Tuna Bait

Mr. Tamio Otsu, Chief, Resource Assessment and Development Investigations at the Honolulu Laboratory, reported that arrangements have been completed to bring to Honolulu a shipment of live northern anchovy which will be used in additional skipjack tuna fishing tests. The northern anchovy will be brought to Hawaii on board Mr. Matt May's *Pacific Trojan* during its trip to Hawaii to enter the fisheries there. A contract was entered into with Mr. May for the purchase of up to 600 scoops of anchovy. Word was received from Mr. May that he left California on May 27 with a load of 200 scoops of 5 in. and 300 scoops of 1-1/2-3 in. anchovy. The anchovy will be placed on board one or two local skipjack tuna boats for sea tests. The local tuna industry and the Pacific Tuna Development Foundation are cooperating in this project.

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Mr. Thomas Hida, Acting Leader, Insular Resources Task at Honolulu, reported that members of the Task were engaged in various activities. Mr. Richard Uchida, Leader of the Task continued to work on a special detail at FAO in Rome. Research Assistant Paul Shiota and newly hired Research Assistants Martina Queenth, Glenn Higashi, and Darryl Tagami (temporary hires) are participating in a Northwestern Hawaiian Islands (NWHI) cruise on the *Townsend Cromwell*. Research Assistant Robert Hoffitt, another temporary employee, joined the *Cromwell* at Midway Island during the latter part of the month. Research Assistants Thomas Kazama and Robert Humphreys returned from a charter cruise to the NWHI on the *Easy Rider*; Research Assistant James Uchiyama worked on the revision of a manual for the foreign fishing vessel observer program.

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Mr. Ray Sumida of the ADP group reported that work is continuing on keypunching the enormous amount of billfish data that was received from the local fishing industry and from the recreational fishing groups in New Zealand. Mrs. Sally Kuba is continuing to write programs to summarize billfish data from the Honolulu Laboratory's data set. New temporary hires Mss. Cynthia Lee, Patricia Halliday, Barbara McClard and Pauline Mitchell came on board to help with coding, keypunching, and verifying the billfish data. Mr. Sumida completed the NWHI cruise Standard Operating Procedures (SOP); copies of the SOP were distributed to the scientific field party presently on a cruise on the Townsend Cromwell.

Estimated 1977 Hawaii Landings of Skipjack Tuna Continue Above Long-Term Average

The April 25 to May 29 Hawaii landings of skipjack tuna were estimated at 344 metric tons (MT), which is 94 MT below the 1976 landings for the same period and 158 MT below the 1948 to 1976 long-term average. The cumulative landings from January through May 29, however, were estimated at 1,468 MT, which is 390 MT above last year's catch for the same period and 425 MT above the 1948 to 1976 long-term average.

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Pulou Niuatoa, employee of the Government of American Samoa, recorded the lengths of 2,711 albacore from 60 vessels from April 1 to May 13. He also collected 64 sets of catch and effort data. Based on data from 5 vessels, the average size of albacore for the period was 91.8 cm and the catch rate averaged 1.72 albacore per 100 hooks.

FISH-ENVIRONMENT INVESTIGATIONS (FEI)

Planning for Seamount Ecology Study Underway

Dr. Richard Barkley, Chief, Fish Environmental Investigations at Honolulu, began formulation of a seamount ecology study which is being developed in conjunction with the Northwest and Alaska Fisheries Center staff. The initial work involved a literature survey, evaluation of observational evidence, and development of a plan for a definitive study of Taylor columns as a part of the physical environment of seamounts.

The Taylor column is not an altogether neglected subject. There has been some rather lively studies of this effect, inspired by the recent hypothesis that Jupiter's Red Spot, a huge, persistent and geographically stationary feature on the rapidly rotating gas planet, is such a column. Also, oceanographers have used it to explain various complications encountered during the MODE operation in the Atlantic a couple of years ago.

The Taylor column should perhaps be called a Proudman column, or Proudman-Taylor column, since it was first theoretically predicted by Proudman in 1916, and experimentally confirmed by Taylor in 1921. Although the effect is clearly "real," which is to say readily demonstrated in nature. Theory is moderately advanced, to the point where the steady state effect is clearly understood, though the non-steady response to variable currents has not been worked out. There are two types of field evidence for Taylor columns in the sea: eddies, usually clockwise ones, over seamounts, and odd sediment distributions around the bases of seamounts (asymmetrical size distributions, scouring, and moats). No one has as yet managed to settle the question with adequate current measurements.

Tuna Behavior Studies Continue in Experimental Ecology of Tunas Task

Dr. Andrew Dizon, Leader of the Experimental Ecology of Tunas Task at the Honolulu Laboratory, reported that members of the Task conducted experiments designed (1) to further understand the behavior of tunas under turbid conditions, (2) to determine thermoregulatory abilities of yellowfin tuna, and (3) to study energy requirements in skipjack tuna. However, few data were collected in the turbidity experiments; time was spent is rebuilding the test tank and obtaining samples of muds used to produce turbid conditions.

To date, 4 small (ca. 45 cm) yellowfin tuna have been tested to determine their abilities to regulate body temperature. A small ultrasonic transmitter is used to telemeter body temperature; the temperature sensing element is inserted into the red muscle at approximately the hottest spot within the fish. The output of the tag as well as swim speed is continuously monitored over a 3-day period during which the ambient sea water is maintained at one of the 3 temperatures (20°, 25°, or 30° C). Regulation is within 0.05° C.

Preliminary analysis of data from the first fish revealed something interesting; if this fish is typical, it looks as if there is evidence of true physiological thermoregulation, as indicated by the following data:

	20°	25°	30°
Swim speed (length sec^{-1})	0.977 ± .015*	1.137 ± .022*	1.424 ± .027*
Body temperature	20.93°	25.96°	30.73°

It can be seen that as temperature was raised swim speed became significantly higher. A Q_{10} relationship of about 1.5 was observed but excess body temperature remained constant. This is remarkable because heat production in fish is proportional to velocity cubed so that at 1.424 lengths sec^{-1} (30°) heat

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* 95% confidence limits

production should be 3 times that at 0.977 lengths sec^{-1} (20°). Yet, the excess body temperature at 30° was smaller (0.73° C) than the excess body temperature at 20° (0.93° C) in spite of the fact that the fish was swimming faster. However, more confidence about the conclusion of thermoregulation must await further analysis of the data. (The temperature data were taken from only 8 measurements subsampled from over 75 recorded during experimentation.)

It has been the goal of the Task to determine respiration rate at velocities greater than two lengths sec^{-1}. Captive fish won't spontaneously swim at a rate greater than this for any length of time, and persuading them to swim faster in the small volume of water necessary for respiration measurements seemed like an insurmountable problem. Two approaches were tried to solve the problem. Kawakawa, skipjack tuna, and small yellowfin tuna maintain hydrostatic equilibrium with lift generated by their pectoral fins (and other structures). The magnitude of the lift is a function of their velocity through the water. Faster swimming generates more lift and hydrostatis equilibrium is reached at the point when lift cancels tendency to sink. Increased density thus requires increased speeds to prevent the fish from sinking to the bottom of the tank.

The density of kawakawa was increased by feeding them plastic encapsulated lead weights. Stomach volume is sufficient to increase speeds required for hydrostatic equilibrium by four times. Using a 200 g slug of lead it was possible to double the swim speed of a 40 cm kawakawa; the fish still fed actively and except for the fast swimming and the continuously extended pectoral fins they seemed otherwise normal.

The contradictory requirements for large volumes of water for fast swimming and the small volumes necessary for effective measurements of respiration were solved by use of a 10 in. diameter polyethylene tube kept open by about 1 ft. of head pressure. The fish adapted nicely to the tube and swam continuously for 24 h without undue ill effects. A working model using heavier gauge vinyl tubing and an indoor tank to prevent algae growth are now being built.

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Mr. Heeny Yuen, Leader, Recreational Fisheries Task at Honolulu, completed the first draft of an article that will appear in the printed program of the annual Hawaiian International Billfish Tournament to be held this year on August 15 to 19 at Kailua-Kona, Hawaii. The article describes the kinds of research being conducted on recreational fisheries in various parts of the Pacific.

LA JOLLA LABORATORY

Coastal Fisheries Resources Division

ALBACORE FISHERIES PROGRAM

Dr. Laurs attended the North Pacific Albacore Workshop which was held at the Far Seas Fisheries Laboratory (FSFRL), Shimizu, Japan on May 17 and 18. This was the second of such meetings organized by the Southwest Fisheries Center and FSFRL to promote joint investigations into the biology of North Pacific albacore. The workshop was organized into business sessions and a technical session devoted to presentation and discussion of research results. The workshop was very successful in furthering understanding of the biology of the albacore and it was agreed that cooperative research work between Japanese and U.S. scientists should continue.

After the workshop and business sessions, visits were made to tuna fishing vessels, landing centers, baiting areas, processing plants, a tuna cannery, aquaculture facilities as well as informative visits to the Tokuka and Tokai Laboratories and various prefectural fishery research stations.

Dr. Laurs completed two administrative reports which were presented at the workshop--A review of the U.S. albacore fishing and stock structure and migratory patterns of albacore in the North Pacific. Dr. Laurs also collaborated with Dr. Jerry Wetherall of the Honolulu Laboratory on a growth study of albacore based on recent tagging data.

Dr. Laurs provisional conclusions relative to North Pacific albacore migration patterns and stock structure based on results of the joing NMFS-AFRF tagging study are:

1) More than one group of fish make up the U.S. albacore fishery with fish which comprise the fishery north of about 38° N (off the Pacific Northwest) being separate from those which make up the fishery south of 38° N (off California).

2) During a given season, the amount of exchange of fish between the northern and southern groups is small.

3) The northern group of fish make trans-Pacific migrations between the eastern and western North Pacific resulting in an exchange of fish between the northern area of the U.S. fishery and the Japanese livebait, and at least part of the longline, fisheries.

4) The southern group of fish appear to have a different migration scheme from the northern group of fish.

5) Only a small proportion of the southern group of fish appear to migrate between the eastern and western Pacific.

6) While it is not known where the majority of the southern group of fish migrate, it is presumed that they migrate between the eastern and central North Pacific.

7) The amount of exchange of fish between the southern area of the U.S. fishery and the Japanese livebait fishery does not appear to be large.

Considerable further analysis will be required to confirm these speculations.

MULTISPECIES TAXONOMY PROGRAM

Paper on Flatfish Larvae Near Completion

Dr. Ahlstrom, Leader of the Multispecies Taxonomy group at La Jolla, reported that work continued on several manuscripts including the one on pigmented flatfish larvae (seven kinds) which is nearing completion, one dealing with a rockfish, S. melanostomus, and one dealing with development of the caudal complex in fishes. Dr. Ahlstrom plans to spend a week in Washington getting material for this paper from the extensive cleared and stained collection in the Smithsonian fish collection.

Emphasis is still being placed on identification of fish samples taken from the CalCOFI collections. All of the 1972 samples except for a few from the northern pattern of 7202 which was misplaced for a time, have been identified. About one-half of the samples from the extensive CalCOFI coverage in 1975 have also been identified.

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Dr. E. Ahlstrom, one of the 29 charter members of the American Society of Limnology and Oceanography still belonging to the Society (from 1936) will be honored at a banquet in Lansing, Michigan on June 21.

SURVEY SYSTEMS DEVELOPMENT AND EVALUATION PROGRAM

Dr. Paul Smith Invited to Become Member of SCOR Working Group

Dr. Paul E. Smith, Research Biologist at La Jolla, has been invited by Dr. K.N. Fedorov, President of Scientific Committee on Oceanic Research (SCOR) of the International Council of Scientific Unions to become a member of SCOR Working Group 52 on "Estimation of Micro-Nekton Abundance." The group chairman is Professor W.G. Pearcy of Oregon State University. The terms of reference are to study quantitative sampling of krill, juvenile fish and squid and recommend standard approaches to quantitative sampling of acoustic methods, net sampling, or both. In addition to the sponsorship of SCOR, the working group is backed by the International Council for Exploration of the Sea, the Scientific Committee on Antarctic Research, and the Advisory Committee on Marine Resources Research.

COMMERCIAL AND RECREATIONAL FISHERIES RESEARCH
FOR MANAGEMENT PROGRAM

Preliminary Draft of Anchovy Plan Completed

The development of the Anchovy Fishery Management Plan was the major focus of activity for Program Leader Dr. Dan Huppert at the La Jolla Laboratory. Various aspects of the anchovy fishery, including industrial uses and value of the anchovy products, and recreational participation and catch rates, were investigated. The socio-economic aspects of the fishery were written into the Preliminary Draft of the anchovy plan to be distributed on June 2nd to the Anchovy Advisory Panel. Gary Stauffer and Alec MacCall contributed extensively to the biological analysis in the Plan. The First Draft of the Plan will be prepared following the meeting on June 7 between the Anchovy Advisory Panel and the Anchovy Management Plan Development Team.

Report Prepared on Relative Abundance of Pacific Hake

Dr. Gary Stauffer, Fishery Biologist at the La Jolla Laboratory, prepared a brief report of preliminary information on the relative abundance of Pacific hake (*Merluccius productus*) from cursory results of the 1977 U.S.-U.S.S.R. egg and larva survey. The purpose of this report was to give the Northwest and Alaska Fisheries Center information on the status of the 1977 hake stock in advance to aid in determining the available surplus for 1978 season as requested by the Washington office. In comparison with the 1976 U.S.-U.S.S.R. *Poseydon* survey conducted from mid-January to mid-February, the percentage of positive stations for 1977 is greater as is the mean number of larvae per 10 square meters. It can be concluded that the extreme below-normal extent of hake spawning area and possibly spawning biomass implied by the 1976 survey did not persist into 1977 except for possibly in the southern half of the range. It will not be possible to make a quantitative comparison of the result of this 1977 cruise with the CalCOFI time series of relative magnitude of Pacific hake spawning biomass until the larva counts and size composition data are available.

Rockfish Research Plans Discussed

Dr. Gary Stauffer, Fishery Biologist, called a meeting with R. Lasker, E. Ahlstrom, J. MacGregor, H. Moser and D. Huppert to discuss identification and enumeration of rockfish larvae in CalCOFI samples. The following objectives were identified: 1) evaluate the egg and larva survey procedure for measuring abundance of particular species of rockfish larvae to assess the absolute or relative biomass of the adult stock, 2) determine the areal and seasonal distribution of specific rockfish larva and therefore adults, 3) estimate the relative or absolute abundance of the important adult stocks for which we have positive larva identification, and 4) observe and note special features or characteristics of rockfish larvae that could potentially be useful in future species identification of presently unidentified larvae.

The consensus was that rockfish larva sorting should be done for 1975, 1972, 1969, 1966, 1956 and 1958 (or 1959), in that order, with 1956 and 1958 being done if time permits. It should take about 1-man year for four CalCOFI years. The four species Sebastes paucispinis, bocaccio; S. jordani, shortbelly rockfish; S. macdonaldi, Mexican rockfish; and S. levis, cow cod, would be identified and enumerated but the first two offered the most potential for the stated objectives. The larvae will also be sized.

Editing Continues on Aerial Marine Resource Monitoring Systems Data

Mr. Joe Caruso, Mathematics Technician, completed the computer program for editing the sighting data as part of the data management system for aerial fish spotter logs compiled by Jim Squire, Fishery Biologist at the La Jolla Laboratory. Keith Parker, Statistician, was trained to take over the data edit process to replace Caruso whose appointment terminates in June. To date, all of the 1976 sighting records and the 1976 January-June effort records have been edited, updated and stored on tape. Thus far, Bob Scheldrup, Technician, has completed coding for 1976, 1975 and part of 1974. A second coder, Mike Klicpera, recently hired for the summer, is being trained in the coding procedures. He will begin with the 1968 survey data. At the present rate, the coders will complete 1 year of data every 15 working days.

Anchovy Vessel Log CPUE Analysis in Progress

Mr. Keith Parker, Statistician, completed the code format for the CF&G vessel logs from the anchovy reduction fishery. This work is being done as part of the Instituto Nacional de Pesca-CalCOFI subcommittee on catch-per-unit of effort (CPUE) with the objective of evaluating these logs for measuring effort of this pelagic purse seine fishery. The major problem will be to specify a measure of nominal effort such that CPUE is an indicator of anchovy biomass.

Oceanic Fisheries Resources Division

PORPOISE/TUNA INTERACTION PROGRAM

Arrangements Made to Test Satellite-Linked Porpoise Tracking System

Arrangements have been completed between the National Marine Fisheries Service and the newly-established Hubbs/Sea World Research Institute in San Diego to begin experimental studies in May to test the satellite-linked porpoise tracking system. The transmitter pack, developed by the NMFS Fisheries Engineering Laboratory (NFEL) in Bay St. Louis, Mississippi, to fit on the back of a porpoise, will be placed on a live bottlenosed dolphin in a holding pool at Sea World for 10 days to evaluate the equipment's capability to be received by a satellite when transmitting from a marine environment.

Coordinating the studies for the Southwest Fisheries Center is Ms. Jackie Jennings, Leader of the Porpoise Tagging Program. The long-range objective of the study is to provide a transmitter package that could be attached to about 50 porpoise per year to determine the extent and routes of migration of each of the important stocks of porpoise. Such a device is the only feasible way to determine whether or not certain stocks migrate into and out of the area of the tuna fishery. This information is necessary for accurate assessments of the sizes of such porpoise stocks. The work to develop the transmitter is being jointly funded by the Southwest Fisheries Center, NFEL, and the NOAA National Data Buoy Program at Bay St. Louis.

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Dr. William Perrin, in charge of the Porpoise Biological Studies in the Porpoise/Tuna Interaction program at the La Jolla Laboratory, reports that his staff has completed processing the spotted and spinner porpoises brought in from the area southwest of the Galapagos Islands. These data will now be analyzed to determine if these animals are of different stocks than those found further to the north.

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According to Dr. Perrin, prospects are good for a meeting on age determination of odontocetes (toothed whales, dolphins and porpoise) at the Southwest Fisheries Center in La Jolla in April 1978. The U.S. Marine Mammal Commission is contributing $10,000 and it appears that the International Whaling Commission may also contribute monies for the support of this meeting. The main use of the funds will be for travel costs in bringing investigators from Japan, South Africa, and the U.S.S.R. to the United States to participate in the meeting.

TUNA RESOURCES PROGRAM

With Return of Tuna Fleet to Sea, FAX Reporting Rates Expected to Improve

	Weather Observations	XBT Observations	Monthly Total	Total Year to Date
1976	262	21	283	1,361
1977	178	22	200	670
Percent Change	-32.1%	+4.8%	-29.3%	-50.8%

Reporting rates for March, April and May 1977 were significantly below normal owing to the fact that most of the tuna fishing vessels carrying NMFS-supplied FAX equipment returned to port on March 2. The tropical tuna fleet remained in port until May 12 when the bulk of the fleet sailed for the fishing grounds in the eastern tropical Pacific. With the entire fleet now at sea, reporting rates are expected to approach normal in June.

The tuna fishing vessel, Santa Rosa, led all cooperating vessels in May by radioing 34 weather and 13 XBT observations to radio station WWD. The Santa Rosa is skippered by John and Noah Gomes.

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Mr. Izadore Barrett, Director of the Southwest Fisheries Center, has indicated that the reporting rates from FAX program participants must improve to a level commensurate with that agreed to by the participating vessels. In view of this, Commerce-licensed radio station WWD at the Scripps Institution of Oceanography radioed to all participating vessels on May 31 that, "NMFS will be closely monitoring the reports of FAX participants during the next two months," and that "FAX machines will be removed from participants that do not abide by the cooperative agreement."

Sampling of Foreign-Caught Tunas Continues in Puerto Rico

Biological Technician Eugene Holzapfel is continuing to sample foreign-caught tunas in Mayaguez, Puerto Rico. Three types of samples are being collected and sent to the La Jolla Laboratory for processing: 1) length-frequency, 2) species composition, and 3) biological samples (otoliths, length-weight, identification of bigeye tuna from livers). As of May 31, 1977 the following samples have been received.

	Yellowfin		Bigeye		Skipjack		Albacore		Other	
	# of fish sampled	Tonnage sampled (m tons)	# of fish sampled	Tonnage sampled (m tons)	# of fish sampled	Tonnage sampled (m tons)	# of fish sampled	Tonnage sampled (m tons)	# of fish sampled	Tonnage sampled (m tons)
Length-frequency	423	62	283	34	301	607	200	655		
Species Composition	573	62	252	28	0	0	0	0		
Biological	134	-- 1/	251	-- 1/	4	-- 1/	0	0	2	-- 1/

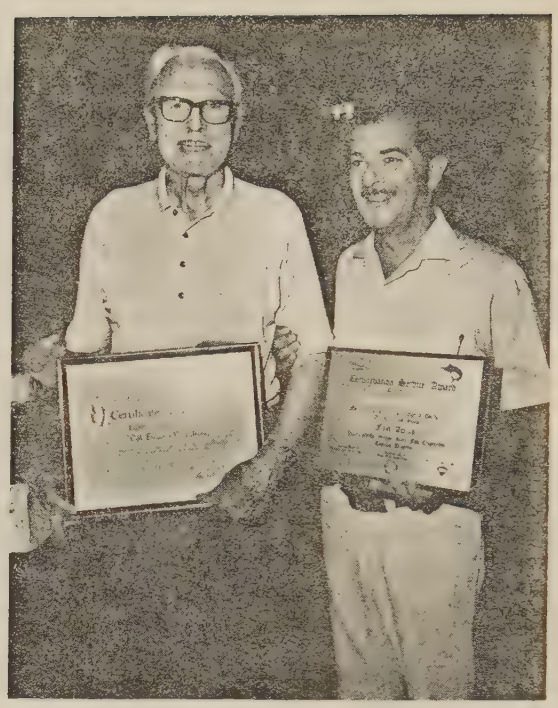
1/ tonnage unknown

NMFS Biologist Presents Gardiner Awards to Mexican Sportboat Captains

Mr. James Squire, Fishery Biologist at the La Jolla Laboratory, accompanied by Mr. Ken Raymond, Scientific Illustrator, traveled to several fishing resorts located around the tip of Baja California, May 16 to 19, where Mr. Squire presented the seventh annual Gardiner Foundation awards to the Mexican sportboat captains who tagged and released the most marlin and sailfish during 1976. The top cash awards of $100 went to Jesus Ruiz of Rancho Buena Vista, who tagged and released 90 marlin and sailfish in the eastern contest area, and Ramon Burgoin of Cabo San Lucas, who tagged 40 billfish in the southern contest area.

Engraved plaques also went to the first three place winners in both contest areas and to Hotel Rancho Buena Vista in the eastern area for their efforts in encouraging their captains to tag and release a total of 450 billfish in 1976.

The Gardiner Awards were established by the late Tom Gardiner, a prominent San Francisco sportfisherman and conservationist to encourage Mexican fishing boat skippers and fishing resorts to participate in the cooperative Marine Game Fish Tagging program.



Shown at left: Colonel Eugene P. Walters (U.S. Army, retired), owner of Hotel Buena Vista and right: Ted Bonney, Manager.

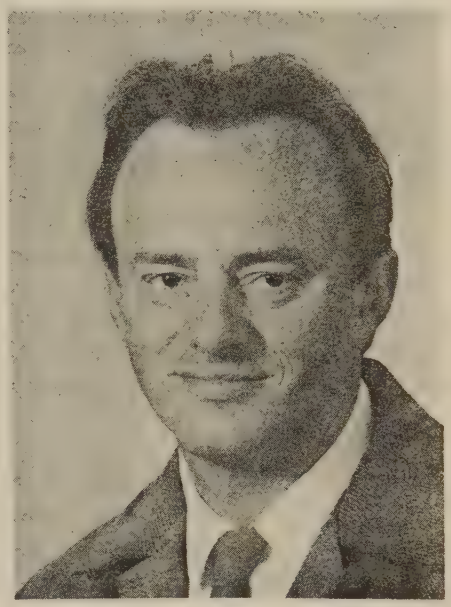
Much of the information on the migration and habits of marlin and sailfish off southern California, Mexico, and Australia have been obtained from the fish tags applied by sportfishermen. Since the Cooperative Marine Game Fish Tagging program began in the Pacific in 1963, certain general migration patterns have become evident. Marlin are found throughout the year in varying abundance near the entrance to the Gulf of California. They appear to migrate southward and westward in late spring and summer. Some fish tagged off the east coast of Baja have migrated round Cape San Lucas and have been recaptured northward along the west coast of Baja California during early summer.

Of particular interest this year was a special award given to Colonel Eugene P. Walters (see photo). A U.S. Department of Commerce Certificate of Appreciation, signed by then Secretary of Commerce Eliot Richardson and Dr. Robert White, Administrator of NOAA, noted the cooperation rendered the United States on behalf of the Cooperative Marine Game Fish Tagging program and other U.S. research programs involving marine game fishes.

According to Mr. Squire, Colonel Walters assumed operation of Rancho Buena Vista in 1959 and subsequently developed it into one of the foremost big game billfishing operations in the world. He has provided facilities and encouragement for scientists studying the geology and biology of this area of Baja California. In addition to his enthusiastic support of the NMFS tagging program, he has cooperated in a billfish catch sampling program and in fish behavior studies conducted by Dr. Ted Hobson of the Southwest Fisheries Center Laboratory in Tiburon, California.

PACIFIC ENVIRONMENTAL GROUP

Gunter Seckel Named New Chief of Pacific Environmental Group



Effective May 8, Mr. Gunter R. Seckel was named as the new Chief of the Pacific Environmental Group (PEG) in Monterey, California, a National Marine Fisheries Service laboratory within the SWFC's organizational structure.

As Chief of PEG, Seckel, who is an Oceanographer, will be responsible for directing a team of oceanographers and fishery biologists studying air/sea interactions and how these affect the abundance and distribution of vital fishery resources. He replaces James R. Johnson who is now the NMFS Regional Fisheries Attache in Tokyo, Japan.

On the staff of PEG since 1970, Seckel has been the Leader of the Ocean Modeling and Forecasting program. Previously, he had been on the staff of the Center's Honolulu Laboratory conducting oceanographic studies in support of the Hawaiian skipjack tuna fishery, and planning and directing the Trade Wind Zone Oceanography investigations.

Seckel was born in Osnabruck, Germany. He received a B.S. degree in Physics and a M.S. in Oceanography from the University of Washington.

The new PEG Chief serves on a number of scientific committees and is a member of many professional and scientific organizations. He is the author of 31 published papers.

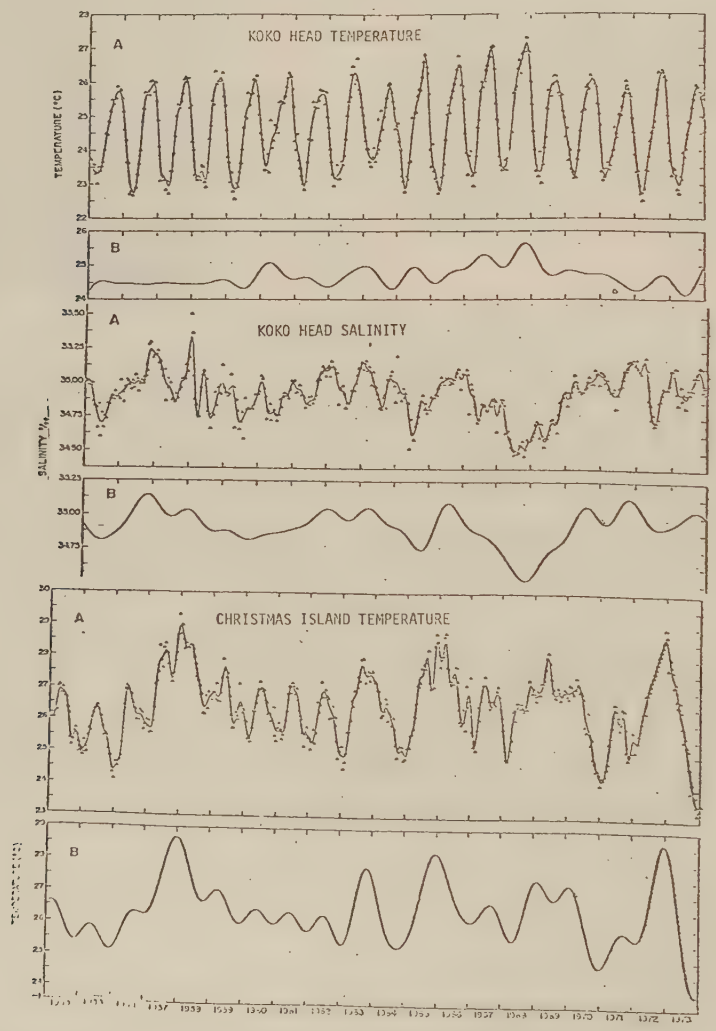
Seckel is married to the former Anita Naber. They have no children.

OCEAN MODELING AND FORECASTING

Sea Surface Temperature and Salinity Time Series--The Signatures of Ocean Processes

For many years the Honolulu Laboratory has regularly measured sea surface temperatures and salinities at Koko Head, Oahu, and at Christmas Island, near the equator in the central Pacific. The series of observations are now enabling scientists at PEG to gain an understanding about long-term ocean variability at these locations. In a paper to be published in the Fishery Bulletin entitled, "Koko Head, Oahu sea-surface temperatures and salinities, 1956-73, and Christmas Island sea-surface temperatures, 1954-73," Mr. G. Seckel of the Pacific Environmental Group and Ms. M. Yong of the Honolulu Laboratory have analyzed the time series and brought the data into a form useful for applications.

The Koko Head temperatures and salinity and the Christmas Island temperature series are shown in the figure. In the upper panels, variability of less than 3 months is filtered out. In the lower panels variability with a period of 12 months or less is filtered out.



At Koko Head the temperature has a large annual cycle of the type mid-latitude experience leads one to expect. In contrast, at Christmas Island, the amplitude of the long-term variability is about three times as large as the annual amplitude, with the latter being obscured or absent during a number of years such as 1963 and 1973. The salinity variability at Koko Head behaves similarly as the Christmas Island temperature variability in that the amplitude of the long-term changes is larger than the annual amplitude.

Absolute magnitudes of temperature and salinity provide information about the state of the water but equally as important, the variability in a time series reflects the processes that condition the water. In other words, the time series is the signature of processes. Thus, from the Koko Head temperature series it is possible to conclude that because interannual variability is small, climate scale processes in Hawaiian waters are unimportant. Nothing is further from the truth when the salinity series is considered, according to Mr. Seckel. For example, until 1959 there were essentially no interannual temperature changes, yet the salinity changes were large, reflecting important climatic scale processes.

At Christmas Island the El Niño years stand out as anomalously warm years. The interannual variations are also coherent with an index of the southeast trades (Quinn, 1974, Jour. Appl. Meteorol., 13: 825-830) and with the transport indices of the South Equatorial Current (Wyrtki, 1974, Jour. Phys. Oceanogr. 4:372-380). A substantial part of the interannual variability in the Koko Head salinity and in the Christmas Island temperature is believed to be caused by advection.

The large interannual variability in the equatorial temperatures as reflected by the Christmas Island observations undoubtedly affects the biota in as yet undescribed ways. However, skipjack landings in Hawaii appear to be associated with environmental conditions as reflected by temperature and salinity indices. Equatorial temperatures have shown good correlations with subsequent skipjack catches in the Eastern Tropical Pacific. These correlations do not necessarily mean that skipjack and temperature and/or salinity are causally related. It is probable that the current field, having a large effect on the interannual variability of the Koko Head salinity and Christmas Island temperature, also affects the distribution and therefore the availability of tunas. Thus, learning to read the signatures of temperature, salinity, or other environmental time series will help to understand environmentally-related changes in fisheries.

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Paul N. Sund, Platforms of Opportunity Coordinator at the PEG, has been asked by the Marine Mammal Division (MMD) of the Northwest and Alaska Fisheries Center to help obtain marine mammal observations from ships of opportunity for annual assessment of populations of marine mammals. Since observations in Alaskan waters are of particular interest to the MMD, Mr. Sund started a program of observations in 1974 on Alaska State Ferries in southeastern Alaska. Each summer the U.S. Forest Service employs naturalists

who serve as information specialists to inform the passengers of environmental affairs. As part of their duties the naturalists make marine mammal observations, bird sightings, and collect environmental data. In May Mr. Sund made an annual trip to Alaska to help train the naturalists in marine mammal observations. The data from the Forest Service observers have proved of high quality and usefulness to the MMD.

TIBURON LABORATORY

PHYSIOLOGY INVESTIGATION

Experiments Started to Determine Minimum Food Requirements in Striped Bass Larvae

Task Leader Dr. Jeannette Whipple at the Tiburon Laboratory reports that experiments to determine the minimum food requirements for normal growth and development in striped bass larvae began this month after a successful spawning on May 12. Larvae are feeding at six different food densities, and their rates of growth, development, yolk and oil globule utilization are being monitored. Nineteen days after fertilization significant differential growth has occurred. Noticeable differences in the degree of ossification, oil globule size, and general organ development have been noted in the different food densities. Initiation of feeding began 7 days after fertilization. The establishment of feeding coincided with a stabilization in the mortality rate. Prior to feeding, larvae were dying at high rates. Mortalities have remained at or near zero from the inception of feeding to day 19. Cannibalism first appeared on day 17 and, as in previous experiments, seemed to be a function of food density.

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Dr. Jeannette Whipple performed some preliminary studies attempting to characterize the green pigment in striped bass eggs. A number of tests show that the pigment is extremely stable over a wide range of salinity, pH, and temperature and is insoluble in common carotenoid solvents. Further work on identification of the lipoprotein-carotenoid complex will be done, as well as studies determining variability between females and the relationship of the green pigment to increased survival to hatching.

FISH COMMUNITIES INVESTIGATION

Study of Groundfish Fillet Recovery Continues

Mr. Edward Ueber, Economist with the Rockfish Analysis Tast at the Tiburon Laboratory, assisted by Task Leader Dr. William Lenarz and Fishery Biologists Peter Adams and Tina Echeverria, returned to the Ocean Beauty Seafood plant in Sacramento May 2 for a second session gathering data to determine the effectiveness of recovering fillets from groundfish under various operating circumstances. This effort produced greatly improved sampling techniques.

Rockfish Tagged for Growth Studies

Dr. Lenarz, Mr. Adams, and Miss Echeverria, of the Rockfish Analysis Task, joined by other personnel from the Tiburon Laboratory, chartered the partyboat, Speed King, to tag and release yellowtail and olive rockfish for growth studies. A total of 107 rockfish survived capture and tagging and were returned to their habitat. Success was highest with the yellowtail rockfish, where 90 of 95 survived. Few olive rockfish were caught, and the survival rate was low.

Economist Visits Northern California Ports

Mr. Edward Ueber visited the northern California ports of Ft. Bragg, Eureka, and Crescent City, May 9 to 13, to continue collecting economic data on fisheries based there. He spent 2 days observing operations aboard otter trawlers, and conducted an experiment at one of the processing plants to determine the recovery rate of flesh when fillets with skin pass through a skinning machine.

Seasonal Appearance of Kelp Forests in Northern California Study Sites

In their continued monitoring of the nearshore habitats at study sites near Albion this month, Dr. Edmund Hobson, Leader of the Nearshore Recreational Fish Communities Task, and Fishery Biologist Tony Chess at Tiburon reported that some Nereocystis plants are developing on the more inshore reefs. These plants, which constitute the major elements of the kelp forests in these waters, have not yet begun to develop on the deeper reefs, where the more extensive forests are expected to appear later in the season.

FISHERIES DEVELOPMENT INVESTIGATION

Experimental Euphausid Fishery Suspended

Mr. Sus Kato, Investigation Leader, reported that experimental fishing for Euphausia pacifica was suspended this month when the vessel, Lady Olga, lost its special midwater net. As the net was being hauled in with a substantial catch, the towing swivel broke due to a hairline fracture.

About 2,500 pounds of euphausids were landed by the Lady Olga. Some of the earlier catch, which was supposed to be sent to Japan, will be apportioned to a local fish-food manufacturer who had ordered a substantial quantity for trials.

If either market finds the euphausids acceptable, Mr. Kato said that his investigation will build a larger midwater trawl to try and increase the catch rate, which averaged about 125 lbs/towing hour with an 8 by 10-ft trawl.

Recreational Fisheries Improvement Task

Mr. Roger Green, Task Leader, noted that the coho or silver salmon now being pen-reared at the Tiburon Laboratory began to show some growth, going from 27 to 37 grams average weight in 10 days.

A feeding experiment, comparing effects of year-old and new, dry pelletized salmon food on growth and mortality, was begun by Susan Smith this month. Fifty fish in each group are housed in subminiature floating net pens. An analysis of the old food disclosed that vitamin C content was practically exhausted due to long storage. The salmon's diet may be supplemented, however, by unknown quantities of wild food drifting through and growing upon the net enclosures. So far, the salmon have not shown any symptoms of vitamin C deficiency. Analyses of other vitamins and for rancidity will be obtained next month for both the old and the new food.

Scientists at the Tiburon Laboratory were fortunate in locating a source of early smolting coho salmon fingerlings for delivery in June or July. Because of the impending effects of drought this summer, the fish, from Toutle River, Washington, were excess to rearing capabilities of the Oregon grower who purchased them several months ago. Also, it is probable that a fish transport truck from the NMFS, Northwest and Alaska Fisheries Center will be available to move the fish.

The first tag return from the Tiburon Laboratory's 1976 release of king salmon was received this month; it came from a 15-inch fish caught just outside of the Golden Gate.

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Mr. Green conducted a fishing power experiment on the rockfish charter cruise. Data were collected on the effects on catch of two terminal rigs, two lure types and two line types in a three-way Latin square design. Eight combinations of gear were rotated among eight anglers and eight rail positions to achieve equal time with all combinations.

Lloyd Richards, Head Technician for the salmon project, left the Tiburon Laboratory for a new job in Alaska with the Enforcement Division.

Anglers' Guide to the United States Pacific Coast

Ms. Susan Smith reported that this month another set of color proofs of the Anglers' Guide, co-authored by James Squire of the La Jolla Laboratory and herself, this time of the entire book, was received from the printer instead of the expected "blueline" proofs that were ordered. This unexpected "extra step" in the book's production will probably further delay publication; however, Ms. Smith hopes to receive the final blueline proofs some time next month.

The Anglers' Guide is a special NMFS publication that describes marine game fish, fishing grounds, and angler facilities along the U.S. West Coast and around the tropical islands of Hawaii, American Samoa, and Guam.

HONORS AND AWARDS

At an honor awards ceremony in the auditorium of the Southwest Fisheries Center on May 26, Center Director Barrett presented awards and citation to the following shown in the accompanying photograph: From left: James Zweifel, Mathematician, Quality Step Increase and Outstanding Performance Rating; Ruth Miller, Biological Technician, Outstanding Performance Rating; William Perrin, Fishery Biologist, Quality Step Increase and Outstanding Performance Rating; Rebecca Morrow, Clerk-typist, Cash Award; Joseph Powers, Operations Research Analyst, Outstanding Performance Rating; Gene Tillerson, Mathematical Aid, Cash Award; Frances Tonsich, Secretary, Cash Award; Al Coan, Mathematician, Cash Award; Robert Counts, Fishery Biologist, Cash Award; James Coe, Fishery Biologist, Cash Award.

Not shown in the photograph were: William Flerx, Biological Technician, who received a Cash Award, Joanne Webber, Secretary, who was given an Outstanding Performance Rating, Charles Oliver, Computer Programmer, Outstanding Performance Rating, and Benjamin Remington, Executive Officer, Quality Step Increase.

Shown are Henry M. and Elivia Orr who received a citation in the 1977 National Volunteer Activitist Awards competition. Mr. Orr, who is a Scientific Illustrator at the La Jolla Laboratory and his wife were one of 68 national semi-finalists. The Orrs were honored for their volunteer services to severely handicapped persons. The certificate was presented jointly to the Orrs by Center Director Barrett and a representative from the United Way at a Center Awards ceremony.

PUBLIC RELATIONS

May 4 - Staff members of the California Department of Fish and Game held a meeting at the Tiburon Laboratory to receive recommendations from the public with regard to 1977 herring regulations.

6 - Dr. W. Fox, Leader of the Oceanic Fisheries Resources Division at the La Jolla Laboratory, presented a brief overview of the Porpoise Tuna Interaction program and later held an hour-long informal discussion on this subject with attendees at the National Academy of Sciences Ocean Policy Committee meeting at the Scripps Institution of Oceanography in La Jolla.

7 - Tony Chess, Fishery Biologist at the Tiburon Laboratory, presented a talk on shoreline ecology to a troop of Sea Scouts at Bodega Bay, and then led them on a field trip along the shore.

18 - Mr. John Everett, Leader of the Porpoise/Tuna Interaction program and Lt. Terry Jackson, NOAA Officer detailed to the La Jolla Laboratory, presented the American Tunaboat Association (ATA)-sponsored documentary film detailing the events of the porpoise behavior cruise on the San Diego-based purse seiner, Elizabeth C.J., at a Lions Club luncheon in Chula Vista, California on May 18. Also attending the luncheon as a guest speaker was Mr. Joe Codinka of the ATA who presented the industry's view of the porpoise/tuna problem. Approximately 35 Lions Club members attended the luncheon and discussion.

May 18 - Mr. H. Yuen of the Honolulu Laboratory spoke on recreational fisheries to the members of the Hawaii Kai Game Fishing Club and the Leeward Trolling Club.

SEMINARS

Honolulu Laboratory

May 24 - Dr. Roy Mendelssohn spoke on "Allocation and yield when there are many objectives."

La Jolla Laboratory

May 2 - Dr. Steinar Saelid, Division of Engineering Cybernetics, University of Trondheim, Trondheim, Norway, spoke on "Modeling and prediction of Barents Sea circulation."

23 - Makoto Kimura, Southwest Fisheries Center, discussed "Observations on dentinal growth layers and age determination of known age bottlenose dolphin, *Tursiops truncatus*."

Pacific Environmental Group

May 18-20 - Lt. Craig Nelson and Dr. D. Parrish attended a California Department of Fish and Game training conference in Fresno and presented invited seminars.

These seminars described the various components of the transport structure of the California Current and the implications of seasonal and geographical variations in transport upon the reproductive success of fishes.

Tiburon Laboratory

May 6 - Dr. Evelyn Shaw of Stanford University presented a talk on "Fish in schools."

13 - Dr. Edmund Hobson discussed "A comparison between reef fishes in kelp forests and on coral reefs."

20 - Tom Yocom spoke on "Effects of acclimation, temperature and food availability on the rate and selectivity of feeding by yellow perch."

27 - Dr. John McCosker, California Academy of Sciences, presented a talk on "Relationships on the living coelocanth--importance to fisheries."

VISITORS

Honolulu Laboratory

May 2 - Mr. Peter T. Wilson, Papua, New Guinea.

4 - Dr. John E. Byrne, U.S. Fish and Wildlife Service, Region 1, Portland, Oregon.

12 - Dr. Albert Smith, Pathology Department, St. Francis Hospital, Honolulu.

18 - Mr. Lon Manar, former employee of the Honolulu Laboratory.

20 - Hon. Toalipi Lauti, Chief Minister's Office of Tuvalua (formerly Ellice Islands), escorted by Mr. Kendall Ellingwood of the U.S. Reception Center, Honolulu.

La Jolla Laboratory

May 3 - Susan Capalbo, NOAA, Washington, D.C.

6 - M.R. Greenwood, Northwest and Alaska Fisheries Center, Seattle, Washington.

- David Wallace, Associate Administrator for Marine Resources, NOAA, for informal discussions with Mr. Barrett, and Drs. Lasker and Fox.

9-12 - Messrs. Win Meibohm, Associate Director, National Marine Fisheries Service, accompanied by Mr. Craig Felber and Neva Karrick, Northwest and Alaska Fisheries Center were at the La Jolla Laboratory to discuss personnel matters.

11 - Larry Pryor, Los Angeles Times, Los Angeles, California.

13 - Paul E. LaViolette, NSTL/NORDA, Bay St. Louis, Mississippi.

19 - Elisabeth A. Stull, University of Arizona, Department of Ecology and Evolutionary Biology, Tempe, Arizona.

23 - Michael M. Corum, U.S. Civil Service, San Francisco, California.

24 - Mr. Chuck Tegeler and Mr. Marty Jones, Department of Commerce audit team here to examine Center administrative operations. The team was in the Southwest Region for about three weeks, spending approximately two-thirds of their time in La Jolla. The review concentrated on administrative activities such as time-keeping, travel, overtime, vehicle utilization, etc.

Pacific Environmental Group

May 16 - Robert L. Melrose, NWS, Panama Canal Zone.

23 - Jack Helle, NMFS, Auke Bay Laboratory.

Tiburon Laboratory

May 1 - Deward J. Houck, Jr., Houck Marine Aquarium, San Francisco, California.

4 - Walter A. Dahlstrom, California Department of Fish and Game, Menlo Park, California.

- Gaspare Aliotti, Aliotti Fish Co., Monterey, California.

6 - Jean Jacobs, California Academy of Sciences, San Francisco, California.

18 - David Rice, Lawrence Livermore Laboratory, Livermore, California.

22 - Manny Natsios, College of Marin, Kentfield, California.

25 - Henry Mendoza, K & D Seafoods, Hayward, California.

27 - Tom Cassou, University of San Francisco, San Francisco, California.

MEETINGS AND TRAVELS

May 2 - Honolulu Laboratory Director R. Shomura attended a new conference called by the Coast Guard regarding the Ekvator, a Russian trawler fishing within the 200-mile zone near Midway Island.

- Norman Abramson, Director of the Tiburon Laboratory, participated in a meeting at California Department of Fish and Game, Menlo Park, with Dave Mackett and Fred Kellenberger of the Southwest Fisheries Center and Dick Heimann of California Fish and Game relative to management and information systems.

- Mr. D. Mackett, Program and Planning Officer, SWFC, accompanied by Mr. F. Kellenberger, travelled to Menlo Park, California to discuss State-Federal contracts for automatic data processing.

May 2-3 - Director I. Barrett was in Portland to attend the Scientific and Statistical Committee meeting of the Pacific Regional Fishery Management Council.

2-7 - Illustrator Henry Orr of the La Jolla Laboratory traveled to San Antonio, Texas, to attend the national meeting of Incorporated Mexican-American Government Employees (IMAGE) in his role as Spanish-speaking Program Coordinator.

3 - Program Planning Officer David Mackett in Terminal Island to meet with personnel of the NMFS Southwest Region concerning their needs for habitat protection information.

3-4 - Mr. Shomura, Deputy Chairman, Scientific and Statistical Committee (SSC) of the Western Pacific Regional Fishery Management Council, convened the SSC meeting in the Honolulu Laboratory conference room (in the absence of Mr. I. Barrett, Chairman, SSC).

3-5 - Mr. F. Kellenberger, Supervisory Computer Systems Analyst, in Portland to attend the Coastwide Data Conference meeting.

4-6 - Mr. David Mackett traveled to Woods Hole, Massachusetts to attend the National Data Management Committee meeting.

4-5 - Dr. Bill Lenarz, Tiburon Laboratory, traveled to Portland participate in a meeting on a cooperative rockfish survey.

5 - Norman Abramson, Tiburon Laboratory, attended the first meeting of the Department of Commerce Region IX Field Council in San Francisco, California.

6 - Director Barrett conferred with Regional Director Gerald Howard and Deputy Regional Director Floyd Anders in Terminal Island, California.

7 - Mr. Shomura attended the Pacific Islands Fisheries Development Committee meeting at the Department of Planning and Economic Development conference room.

9-11 - Mr. Shomura attended a 3-day Marine Biology Meeting of the U.S.-Japan Cooperative Science Program convened by the National Science Foundation and the Japan Society for the Promotion of Science to advise these agencies and designate areas where cooperative research seemed especially promising. Mr. Shomura was asked to participate in the meetings by Dr. Allen Holt, Division of International Programs, National Science Foundation, Washington, D.C.

May 9-11 - Dr. Roy Mendelssohn attended the joint national meeting of the Operations Research Society of America and The Institute of Management Science in San Francisco.

10 - Norman Abramson, Tiburon Laboratory, attended a joint session of the Operations Research Society of America and the Institute of Management Science in San Francisco on "Ecosystem Management."

May 14 - June 1 - Dr. M. Laurs and Dr. G. Sakagawa of the La Jolla Laboratory traveled to Japan to attend the North Pacific Albacore Workshop.

15-16 - Dr. Reuben Lasker, Leader of the Coastal Fisheries Resources Division attended a meeting of the Ocean Science Board at Lamont Geological in Palisades, New York.

16-19 - Center Director Barrett in Washington, D.C. to attend the Regional Directors/Center Directors meeting.

18-30 - Dr. Richard Parrish and Lt. Craig Nelson, PEG, traveled to Fresno, California, to attend a California Department of Fish and Game training conference.

18-20 - Dr. W. Fox in Terminal Island to discuss marine mammal research with Gary Smith, Chief, Fisheries Management Division of the SWR, and then to Fresno to present an invited talk at California Fish and Game meeting. He also participated in a seminar on the use of quantitative methods--fisheries modeling.

20 - Mr. Shomura called a meeting of the Baitfish Committee to discuss receipt of a load of northern anchovy from California for use as baitfish by the Hawaiian skipjack tuna industry. Various options on how to dispense the bait for testing were considered.

- Ed Ueber, Tiburon Laboratory, traveled to Portland, Oregon where he participated in a joint session of the Pacific Fisheries Council's Groundfish Management Plan Development Team and the Groundfish Advisory Panel.

23-26 - Mr. Gunter Seckel, PEG, traveled to La Jolla, California and Terminal Island, California to discuss PEG programs with staff.

23-27 - Mr. Paul Sund, PEG, traveled to various places in Alaska to conduct Marine Mammal Training Sessions for Forest Service personnel.